

MENTORSHIP: THE EDUCATION-RESEARCH CONTINUUM

Mentoring of science students stems naturally from the intertwined link between science education and science research. In fact, the mentoring relationship between a student and a scientist may be thought of analogically as a type of double helix forming the “DNA” that defines the blueprint for the next generation of scientists. Although this analogy would not meet the rigorous tests commonly used for exploring the natural laws of the universe, the image depicted does capture how creating and sustaining the future science workforce benefits greatly from the continuum between education and research. The path science students pursue from their education careers to their research careers often involves training under an experienced and trusted advisor, i.e., a mentor. For many undergraduate science students, a summer research internship at a DOE National Laboratory is one of the many steps they will take in their Education-Research Continuum.

Scientists who choose to be mentors share a commitment for both science education and science research. This commitment is especially evident within the research staff found throughout the Department of Energy’s National Laboratories. Research-based internship opportunities within science, technology, engineering and mathematics (STEM) exist at most, if not all, of the Laboratories. Such opportunities for students are helping to create the next generation of highly trained professionals devoted to the task of keeping America at the forefront of scientific

innovation. The *Journal of Undergraduate Research* (JUR) provides undergraduate interns the opportunity to publish their scientific innovation and to share their passion for education and research with fellow students and scientists.

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The theme of this issue of the JUR (Vol. 8, 2008) is “Science for All.” Almost 20 years have passed since the American Association for the Advancement of Science published its 1989 report, *Science for All Americans—Project 2061*. The first recommendation for learning science stated: “The Nature of Science includes the scientific world

view, scientific methods of inquiry, and the nature of the scientific enterprise.” All three elements of the “Nature of Science” are pivotal aspects of a research internship under the mentorship of an experienced and trusted advisor. In addition to internships for undergraduates, an important ingredient in realizing “Science for All” is collaboration involving educators and scientists as they engage science students and the public at large to promote science literacy and to develop the next generation of STEM professionals. The DOE National Laboratories, individually and collectively, form an ideal nexus for nurturing these complementary collaborations.

My “Science for All” experiences at Lawrence Livermore National Laboratory (LLNL) over the last 30 years have spanned pre-college, college, and postdoctoral activities, including mentoring of undergraduate students. Early in my mentoring career, I became aware that undergraduates in particular needed help in answering the question

“what path (or paths) will lead to a challenging and rewarding STEM career?” For many, a successful path included a research internship that would result in expanded skills and training in addition to those received from their academic education. These internship skills were helpful whether the student’s next Education-Research Continuum decision was graduate school or STEM employment. My experience at LLNL mirrors that of my colleagues at other DOE National Laboratories—internships with a dedicated mentor provide undergraduates with a unique set of skills that can underpin their future options and serve to improve the number, quality, and successful outcomes of students who enter STEM careers.

“Science for All” can also be found in the goals of “The America COMPETES Act,” which calls for renewed efforts to increase investments in scientific research and development, strengthen education, and encourage entrepreneurship. Mentoring is an important ingredient in reaching these goals because the success of future endeavors will require a diverse workforce of scientists, technicians, engineers, mathematicians, and STEM educators. A small, but not insignificant, metric of how well the nation is doing to create the next STEM generation can be measured by the abstracts and articles published in the *Journal of Undergraduate Research*. At the “heart” of the JUR is the professional commitment of the DOE National Laboratory workforce to mentor the next STEM generation and to realize “Science for All.”

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